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EXAMINER	
PEREZ DAPLE, AARON C	

ART UNIT	PAPER NUMBER
2154	15

DATE MAILED: 07/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/965,545	DISCENZO ET AL.	
	Examiner	Art Unit	
	Aaron C Perez-Daple	2154	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 June 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8,12-22 and 24-42* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8, 12-22 and 24-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This Action is in response to RCE filed 6/21/04, which has been fully considered.

2. Amended claims 1-8, 12-22 and 24-42 are presented for examination.

3. Claims 9-11 and 23 are cancelled by Applicant.

4. This Action is non-Final.

Claim Objections

5. Claim 1 is objected to because of the following informalities: line 6 recites "of the of the motorized system" where it should recite -- of the motorized system --. Appropriate correction is required.

6. Claim 5 is objected to because it is recited as depending from claim 5. A claim may not depend from itself. The Examiner assumes that claim 5 should depend from claim 4.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. **Claims 1, 19 and 22** are rejected under 35 U.S.C. 102(e) as being unpatentable over McConnell et al. (US 6,002,232) (hereinafter McConnell).

9. As for claims 1 and 19, McConnell discloses a method and means for controlling a motorized system comprising:

measuring an attribute of the motorized system, the attribute comprises at least one of vibration, speed, temperature, pressure, and current in the motorized system (col. 6, lines 25-50, "As discussed above...operation or aging.");

diagnosing a health of the motorized system based on the measured attribute (col. 14, lines 50-58, "The rankings in...to be applied.");

providing a diagnostics signal based on the diagnosed health (robustness rank, noise rank and response time rank, Fig. 11);

prognosing a state of the motorized system based at least in part on the at least one sensed attribute and/or the diagnosed state (col. 8, lines 42-50, "In one method...selected and evaluated.");

providing a control signal based on the diagnosed health (command input 124, Fig. 11); and

providing a feedback operation to determine whether a rate of component degradation has been favorably affected as a result of the control signal (col. 13, lines 7-23, "The system depicted...and response time."; feedback comparator 132, Fig. 11).

10. As for claim 22, McConnell discloses a system comprising:

a motorized system (physical system 26, Fig. 2; col. 6, line 66 – col. 7, line 16, "The methods and...cam mechanisms, etc.");

a communications link coupled to the motorized system (Fig. 11); and

a control system coupled to the communications link comprising:

a controller coupled to the communications link adapted to operate the motorized system in a controlled fashion (control system122, Fig. 11);

a diagnostics system coupled to the communications link adapted to diagnose the health of the motorized system according to at least one measured attribute associated with the motorized system, the measured attribute comprises at least one of vibration, speed, temperature, pressure, and current in the motorized system (robustness rank 160, noise rank 162, response time rank 164, Fig. 11; col. 14, lines 50-58, "The rankings in...to be applied.");

a prognostics system coupled to the communications link that provides prognoses of future states of the motorized system based at least in part on the at least one sensed attribute and/or the diagnosed health and provides the prognoses to the control component (command input selector 166, Fig. 11; col. 8, lines 42-50, "In one method...selected and evaluated."); and

a feedback analysis component that determines whether motorized system degradation has been successfully mitigated via action taken by the control component (feedback comparator 132, Fig. 11; col. 13, lines 7-23, "The system depicted...and response time.").

11. **Claims 36-38, 40 and 41** are rejected under 35 U.S.C. 102(e) as being unpatentable over Madhavan (US 6,004,017).

12. As for claim 36, Madhavan discloses a system to facilitate controlling a motorized system, comprising:

at least one sensor that senses at least one attribute of the motorized system (col. 1, lines 56-58, "The presence and...appropriately placed accelerometers.");

a diagnostics system that diagnosis a state of the motorized system based at least in part on the at least one sensed attribute (col. 2, lines 38-46, "In carrying out...limit cycle oscillations.");

a prognostic system that makes a prognosis of the motorized system based at least in part on the at least one sensed attribute and/or the diagnosed state (col. 2, lines 38-46, "In carrying out...limit cycle oscillations."); and

a controller that controls the motorized system based at least in part on the diagnosed state (col. 2, lines 47-52, "Still further in...the classifier signal.");

the diagnostics system further performs at least a second diagnosis of the state of the motorized system after corrective action is taken by the control component to determine whether corrective action was successful in mitigating degradation of the motorized system (inherent since the system of Madhavan provides continuous diagnostics and control during real-time operation; see col. 2, lines 16-21, "Another object of...ongoing machining operation.").

13. As for claim 37, Madhavan discloses the system of claim 36, the controller controlling the motorized system based at least in part on the prognosis (col. 2, lines 38-46, "In carrying out...limit cycle oscillations.").

14. As for claim 38, Madhavan discloses the system of claim 37, the controller automatically adjusting operation of the motorized system based at least in part on the prognosed future states of the motorized system (col. 2, lines 38-46, "In carrying out...limit cycle oscillations.").

15. As for claim 40, Madhavan discloses the system of claim 36, the prognostic system inferring future operating states of the motorized system (col. 2, lines 22-31, "Still another object...the present invention.").

16. As for claim 41, Madhavan discloses the system of claim 36, the controller automatically adjusting an operating state of the motorized system based at least in part on the prognosis (col. 2, lines 38-46, "In carrying out...limit cycle oscillations.").

Claim Rejections - 35 USC § 103

17. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

18. **Claims 1- 5, 18-22, 24, 30 and 35** are rejected under 35 U.S.C. 103(a) as being unpatentable over Madhavan (US 6,004,017) in view of McConnell et al. (US 6,002,232) (hereinafter McConnell).

19. As for claims 1 and 19, Madhavan discloses a method and means for controlling a motorized system comprising:

measuring an attribute of the motorized system, the attribute comprises at least one of vibration, speed, temperature, pressure, and current in the motorized system (col. 2, lines 39-42, "The method includes...changes in the function.");

diagnosing a health of the motorized system based on the measured attribute (col. 2, lines 39-42, "The method includes...changes in the function.");

providing a diagnostics signal based on the diagnosed health (col. 2, lines 42-46, "The method also...limit cycle oscillations.");

prognosing a state of the motorized system based at least in part on the at least one sensed attribute and/or the diagnosed state (col. 2, lines 38-46, "In carrying out...limit cycle oscillations.");

providing a control signal based on the diagnosed health (col. 2, lines 47-52, "Still further in...on the classifier signal.").

Although obvious to one of ordinary skill in the art and arguably inherent to Madhavan since the vibration signal y(n) can be considered a feedback signal from the controlled system, Madhavan does not explicitly disclose a feedback operation to determine whether a rate of component degradation has been favorably affected as a result of the control signal. McConnell explicitly teaches providing a feedback operation to determine whether a rate of component degradation has been favorably affected as a result of the control signal and to reduce noise in the system (feedback comparator 132, Fig. 11; col. 8, lines 9-16, "For example, if...to reduce noise."). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Madhavan by providing a feedback operation to determine whether a rate of component degradation has been favorably affected as a result of the control signal and to reduce noise in the system, as taught by McConnell above.

20. As for claim 2, Madhavan discloses the method of claim 1, further comprising operating the motorized system according to the diagnostics signal (col. 2, lines 37-52, "In carrying out...the classifier signal.").

21. As for claim 3, Madhavan discloses the method of claim 1, further comprising modifying a setpoint of the motorized system (considered inherent since modifying the spindle speed requires modifying the setpoint for that speed)

22. As for claim 4, Madhavan discloses the method of claim 1, wherein diagnosing the health comprises obtaining a frequency spectrum of the measured attribute and analyzing the frequency spectrum to detect adverse operating conditions (col. 3, lines 7-27, "Chatter prediction using...provide such control."; col. 4, lines 38-52, "The time frequency...Hanning window.").

23. As for claim 5, Madhavan discloses the method of claim 4, wherein analyzing the frequency spectrum comprises analyzing the frequency spectrum to detect faults, component wear and component degradation (col. 1, lines 37-45, "The development of chatter...productivity and quality."; col. 3, lines 7-27, "Chatter prediction using...provide such control.").

24. As for claim 18, Madhavan discloses the method of claim 1, wherein the measuring attribute comprises receiving measurements from at least one sensor (inherent for detecting spindle speed input and vibration signals, Fig. 2).

25. As for claim 20, Madhavan discloses the control system of claim 19, further comprising:

means for modifying operation of the motorized system based on the diagnostic signal (col. 2, lines 37-52, "In carrying out the above...on the classifier signal.").

26. As for claim 21, Madhavan discloses the control system of claim 19, further comprising:

means for modifying operation of the motorized system based on the control signal (col. 2, lines 37-52, "In carrying out the above...on the classifier signal.").

27. As for claim 22, Madhavan discloses a system comprising:

a motorized system (col. 1, lines 38-45, "The development of...productivity and quality.");

a communications link coupled to the motorized system (Fig. 4); and

a control system coupled to the communications link comprising:

a controller coupled to the communications link adapted to operate the motorized system in a controlled fashion (col. 5, lines 45-49, "Fig. 5 is a...as noted above.");

a diagnostics system coupled to the communications link adapted to diagnose the health of the motorized system according to at least one measured attribute associated with the motorized system, the measured attribute comprises at least one of vibration, speed, temperature, pressure, and current in the motorized system (col. 2, lines 22-47, "Still another object...limit cycle oscillations.");

a prognostics system coupled to the communications link that provides prognoses of future states of the motorized system based at least in part on the at least one sensed attribute and/or the diagnosed health and provides the prognoses to the control component (col. 2, lines 38-46, "In carrying out...limit cycle oscillations."); and

Although obvious to one of ordinary skill in the art and arguably inherent to Madhavan since the vibration signal y(n) can be considered a feedback signal from the controlled system, Madhavan does not explicitly disclose a feedback analysis

component that determines whether motorized system degradation has been successfully mitigated via action taken by the control component. McConnell explicitly teaches providing a feedback analysis component that determines whether motorized system degradation has been successfully mitigated via action taken by the control component to reduce noise in the system (feedback comparator 132, Fig. 11; col. 8, lines 9-16, "For example, if...to reduce noise."). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Madhavan by providing a feedback analysis component that determines whether motorized system degradation has been successfully mitigated via action taken by the control component to reduce noise in the system, as taught by McConnell above.

28. As for claim 24, Madhavan discloses the system of claim 22, wherein the motorized system comprises components, devices, subsystems and process controls (col. 1, lines 56-63, "The presence and...complicated random signal.").

29. As for claim 30, Madhavan discloses the system of claim 22, further comprising at least one sensor coupled to the motorized system and the communications link for measuring the at least one measured attribute (inherent for detecting spindle speed input and vibration signals, Fig. 2).

30. As for claim 35, Madhavan discloses the system of claim 22, wherein the control system is implemented on a computer system (col. 5, lines 45-49, "Fig. 5 is a...as noted above.").

31. **Claims 6-8, 12-14 and 25-29** are rejected under 35 U.S.C. 103(a) as being unpatentable over Madhavan (US 6,004,017) in view of McConnell et al. (US

6,002,232) (hereinafter McConnell) and in further view of Hays et al. (US 6,260,004 B1).

32. As for claims 6-8, although obvious to one of ordinary skill in the art, neither Madhavan nor McConnell specifically disclose the method of claim 1 wherein the motorized system comprises a motorized pump nor a fan. However, Hays discloses a method similar to claim 1 which includes measuring an attribute associated with the motorized system which may comprise a motorized pump, a fan, turbine, compressor, blower, or other motorized device (col. 8, lines 37-40, "The method of the...blowers and pumps.").

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Madhavan and McConnell by measuring an attribute associated with the motorized system which may comprise a motorized pump, a fan, turbine, compressor, blower, or other motorized device, in order to detect and correct conditions that may lead to damage of these system, as taught by Hays (col. 2, lines 47-55, "Traditional condition monitoring...pump performance signature.").

33. As for claim 12, Madhavan discloses that various frequency analysis methods may be used (col. 5, lines 56-60, "Many alternative methods...a positive distribution."). These methods would obviously include analysis of amplitude as understood by one of ordinary skill in the art. However, Madhavan does not specifically disclose the method of claim 1, wherein diagnosing the health comprises analyzing an amplitude of a first spectral component of a frequency spectrum at a first frequency. Hays teaches a method similar to claim 1, wherein diagnosing the health

comprises analyzing an amplitude of a first spectral component of a frequency spectrum at a first frequency (col. 1, line 66 – col. 2, line 14, "Rotating machines and pumps...the CSI Application paper.").

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Madhavan and McConnell by analyzing an amplitude of a first spectral component of a frequency spectrum at a first frequency in order to detect and correct conditions that may lead to damage of the motorized system, as taught by Hays (col. 2, lines 47-55, "Traditional condition monitoring...pump performance signature.").

34. As for claims 13 and 14, Madhavan does not specifically disclose the method of claim 1 wherein providing the control signal comprises providing the control signal to increase or reduce cavitation. However, Hays teaches providing a control signal to increase or reduce cavitation in order to optimize pump performance (col. 8, lines 37-48, "The method of the...normal wear and tear."; col. 9, lines 27-34, "Hosts capable of using...to drive the pump.").

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Madhavan and McConnell by providing a control signal to increase or reduce cavitation in order to optimize the performance of a motorized pump, as taught by Hays (col. 8, lines 37-48, "The method of the...normal wear and tear."; col. 9, lines 27-34, "Hosts capable of using...to drive the pump.")

35. As for claim 25, Madhavan does not specifically disclose the system of claim 24, wherein the components comprise bearings, the devices comprise a motor, pump and

fan, the subsystems comprise a motor drive-pump and process controls comprise a pump fluid control. Hays discloses a system similar to claim 25, wherein the components comprise bearings, the devices comprise a motor, pump and fan, the subsystems comprise a motor drive-pump and process controls comprise a pump fluid control (Fig. 1). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Madhavan and McConnell such that the components comprise bearings, the devices comprise a motor, pump and fan, the subsystems comprise a motor drive-pump and process controls comprise a pump fluid control in order to provide a diagnostic system for a motorized pump assembly, as taught by Hays (col. 8, lines 37-43, "The method of...head centrifugal pumps.").

36. As for claim 26, Madhavan does not specifically disclose a motorized system wherein the load comprises at least one of a valve, a pump, a conveyor roller, a fan, a compressor, and a gearbox. Hays discloses a system similar to claim 22, wherein the motorized system comprises a motor and a load, and wherein the load comprises at least one of a valve, a pump, a conveyor roller, a fan, a compressor, and a gearbox (Fig. 1; col. 8, lines 37-43, "The method of...head centrifugal pumps."). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Madhavan and McConnell such that the load comprises at least one of a valve, a pump, a conveyor roller, a fan, a compressor, and a gearbox in order to provide a diagnostic system for a motorized pump assembly, as taught by Hays (col. 8, lines 37-43, "The method of...head centrifugal pumps.").

37. As for claim 27, Madhavan discloses the system of claim 24, wherein the diagnostics system provides a diagnostics signal (signal g(n), Fig. 4).

38. As for claim 28, Madhavan discloses the system of claim 27, wherein the diagnostics signal represents health of the motorized system and the control signal represents control information for the motorized system (col. 2, lines 37-52, "In carrying out...the classifier signal.").

39. As for claim 29, Madhavan discloses the system of claim 24, wherein the controller provides a control signal, wherein the control signal contains control information for controlling at least one of the components, the devices, the subsystems and the process controls (spindle speed control output sc(n), Fig. 2; col. 3, lines 18-27, "Using real data...provide such control.").

40. **Claims 15-17 and 31-34** are rejected under 35 U.S.C. 103(a) as being unpatentable over Madhavan in view of McConnell and in further view of Edison et al (US 5,586,305) (hereinafter Edison). As for claims 15-17 and 31-34, neither Madhavan nor McConnell specifically discloses transmitting signals via a wireless network. Edison teaches a transmitting signals over a wireless or other remote network in a distributed control system (col. 8, lines 48-65, "Fig. 8 is a...wireless or IR link."). It would have been obvious to one of ordinary skill in the art to modify the teachings of Madhavan and McConnell such that the communication link comprises a wireless network and further to transmit one or more signals, including the control and diagnostic signals, via the wireless network, in order to control the process from a remote location, as taught by Edison (col. 8, lines 48-65, "Fig. 8 is a...wireless or IR link.").

41. **Claim 39** is rejected under 35 U.S.C. 103(a) as being unpatentable over Madhavan (US 6,004,017) in view of Grayson et al (US 5,111,531) (hereinafter

Grayson). Madhavan does not specifically disclose the prognostic system comprising a non-linear training system. However, Grayson teaches a control system similar to claim 36, wherein the prognostic system comprises a non-linear training system (col. 3, lines 15-23, "The trainable neural...a teaching algorithm.")

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Madhavan by using a prognostic system comprising a non-linear training system in order to predict and control at least one indirect process variable, as taught by Grayson (col. 2, line 52 – col. 3, line 2, "Briefly, according to this...indirectly controlled variable.").

42. **Claim 42** is rejected under 35 U.S.C. 103(a) as being unpatentable over Madhavan in view of Hays. As for claim 42, Madhavan does not specifically disclose the controller scheduling preventive maintenance for the motorized system based at least in part on the prognosis. Hays teaches the controller scheduling preventive maintenance for the motorized system based at least in part on the prognosis (col. 2, lines 47-55, "Traditional condition monitoring...pump performance signature."). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Madhavan by scheduling preventive maintenance for the motorized system based at least in part on the prognosis in order to prevent damage to the system, as taught by Hays (col. 2, lines 47-55, "Traditional condition monitoring...pump performance signature.").

Response to Arguments

43. Independent claims 1, 19, 22 and 36 have been amended, therefore arguments filed 4/16/04 are moot. No new arguments have been filed with the present Amendment filed 6/21/04.

Conclusion

44. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron C Perez-Daple whose telephone number is (703) 305-4897. The examiner can normally be reached on 9am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Follansbee can be reached on (703) 305-8498. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

7/20/04

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